Appl. N . : 09/738,372
Filed : December 15, 2000

REMARKS

35 U.S.C. 112 REJECTION

The Examiner rejected Claims 22-28, 33-34 and 57-64 under 35 U.S.C. 112, paragraph 2. The Examiner found these claims to be indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Specifically, the Examiner rejected the claims as being incomplete for omitting essential steps, such omission amounting to a gap between the steps. The Examiner identified the omitted steps as: (1) pumping a gain medium within a resonant Fabry-Perot laser cavity; (2) generating Q-switched mode-locked laser pulses using a saturable absorber located within said resonant Fabry-Perot optical cavity; (3) absorbing said Q-switched laser pulses by insertion of a Two-Photon Absorber within said resonant Fabry-Perot optical cavity; and (4) outputting a cw mode-locked laser pulse from said resonant Fabry-Perot optical cavity. The Examiner stated that these steps are essential because they (1) are necessary to generate a cw mode-locked laser pulse as disclosed by the applicant and (2) these steps are not obvious to someone of skill in the art of lasers, as related to claim interpretation, without reference to the specification. In addition, the Examiner states that it is unclear from the claim language how a cw mode-locked laser pulse is generated with the claim steps. Specifically, the Examiner states that it is not clear what function the steps have as related to the generation of the cw mode-locked laser pulses. As to Claim 23, the Examiner states that it is unclear from the claim language how the claimed invention is q-switched and q-switch suppressed. As to Claim 34, the Examiner objected to the "and" at the end of the claim, without any additional steps.

First, as to the objection based on the omission of essential steps (MPEP 2172.01), MPEP § 2172.01 states:

> "A claim which omits matter disclosed to be essential to the invention as described in the specification, or in other statements of record may be rejected under 35 U.S.C. 112, first paragraph, as not enabling. *In re Mayhew*, 527 F.2d 1229, 188 USPQ 356 (CCPA 1976). See also MPEP 2164.08(c). Such essential matter may include missing elements, steps or necessary structural cooperative relationships of elements described by the applicant(s) as necessary to practice the invention.

> "In addition, a claim which fails to interrelate essential elements of the invention as defined by applicant(s) in the specification may be rejected under 35 U.S.C. 112, second paragraph , for failure to point out and distinctly claim the invention See *In re Venezia,* 530 F.2d 956, 189 USPQ 149 (CCPA 1976); *In re Collier*, 397 F.2d 1003, 158 USPQ 266 (CCPA 1968)." **(Emphasis added.)**

Under the language of MPEP 2172.01, as emphasized above, the applicant is only obliged to claim elements that were defined to be essential in the specification or in other statements of record. Applicants did not disclose in the specification, or in any other statement of record, that these steps were "essential." In *Mayhew*, the court ruled one step to be essential. There the court pointed to specific language of importance. "Appellant's specification states that the 'strip...and bath...are raised in temperature above what is ordinarily considered optimum coating temperatures. This is practicable because of special cooling apparatus, specially located.'" *Mayhew*, 527 F.2d at 1233. The above language of the application in that case made it clear that the element was essential to the invention. In the present application, there was no such language regarding any of the elements the Examiner regards as omitted essential elements. It is noteworthy that a second group of claims in the *Mayhew* patent were also rejected because of omission of an essential element, namely the specific temperature and functions of the cooling zone. The *Mayhew* court overturned this second rejection of claims. The court reasoned that a person of ordinary skill in the art could determine the appropriate temperature and functions for the cooling zone based on the specification and particular uses with the patented process. *Mayhew*, 527 F.2d at 1233-1234.

A similar rationale should be applied to this application. The overarching essential steps are those steps that a person of ordinary skill would not do. Here, those steps are the suppression of Q-switching to generate cw mode-locked laser pulses. That is the new step that was introduced by these inventors, and that is what is claimed by the application. The alleged omitted essential steps are steps that anyone of ordinary skill in the art would recognize. First, those of ordinary skill would know that many lasers have a gain medium in the laser cavity, and would know how to build the same. The next two "omitted" elements go to the generation and suppression of Q-switching. Q-switching is a topic that has been covered thoroughly in both scholarly work and patents, and the generation of Q-switched laser pulses is something that a person of ordinary skill could accomplish in a number of ways. See, for example, Kajava, et. al.

Q-switching of a diode-pumped Nd:YaG laser with GaAs, *Optics Letters*, Vol. 21, No. 16, August 15, 1996, pgs. 1244-1246 and Everett, Laser mode-locking, Q-switching and dumping system, Patent number 4,375,684 (1983). The suppression of Q-switching is taught by one of the references the Examiner cites, the Hordvick reference. While there may be several other ways to accomplish this task, the fact that one of these methods is clearly prior art should be sufficient to ensure that this task could be accomplished by a person of ordinary skill in the art. Finally, the Examiner argues that "outputting a cw mode-locked laser pulse from the said resonant Fabry-Perot optical cavity" is another omitted essential element. Output of a laser pulse from within the optical cavity, once such a pulse is generated, is a topic that is surely understood by anybody of ordinary skill in the field. See, for example, Ichinose, et. al., High power multibeam laser, Patent number 3,943,461 (1976). All of these "essential" elements are steps that are known to persons of ordinary skill in the art and are possible features of the invention claimed here, but they are not essential to the invention. In sum, the "essential" elements that were used to reject claims are comparable to the temperature and function rejections in *In re Mayhew*, and like those rejections, should be withdrawn.

In addition, the long-term viability of the *In re Mayhew* decision's "essential elements" ground is not clear. The case is rarely cited for this principle, and the cases on which the majority relies do not clearly support the decision. The majority cites only five cases, all of which overturn at least some of the original §112 indefiniteness rejections. *In re Borkowski*, 422 F.2d 904, 164 USPQ 642 (1970); *In re Moore*, 439 F.2d 1232, 169 USPQ 236 (1971); *In re Sarett*, 327 F.2d 1005, 140 U.S.P.Q. 474 (1964); *In re Corr*, 347 F.2d 578, 146 U.S.P.Q. 69 (1965); *In re Honn*, 364 F.2d 454, 150 U.S.P.Q. 652 (1966). In *Moore,* the court explained how a claim must be interpreted for definiteness:

> "This first inquiry therefore is merely to determine whether the claims do, in fact, set out and circumscribe a particular area with a reasonable degree of precision and particularity. It is here where the definiteness of the language employed must be analyzed - not in a vacuum, but always in light of the teachings of the prior art and of the particular application disclosure as it would be interpreted by one possessing the ordinary level of skill in the pertinent art." *Moore,* 439 F.2d at 1235.

This test does not clearly support the rule in *Mayhew*, as applied by the Examiner. Indeed, *Mayhew* seems to decide the case on a rule that the precedents cited do not clearly support.

In *Microsoft v Reiffin,* 214 F.3d 1342; 54 U.S.P.Q.2D (BNA) 1915, the Federal Circuit panel avoided the question of whether there is such an "essential element" test and decided the case on other grounds. See also, Donald S. Chisum, 6 Chisum on Patents § 7.04[2] (2001). However, in concurrence, Judge Newman felt that the question was ripe in the case and that the validity of the "omitted element" test was questionable. As Judge Newman stated:

> "The district court accepted Microsoft's proposition that the patentee must include in every claim "each and every element" that was described as "part of his invention," whether or not the element is necessary for patentability of the claim. Failure to do so, the district court held, invalidates the claims for noncompliance with the written description requirement of § 112 P[aragraph] 1. That is not a correct statement of the law. Section 112 P[aragraph]2 instructs the applicant to "distinctly claim[] the subject matter which the applicant regards as his invention." This does not automatically require inclusion in every claim of every element that is part of the device or its operation." *Microsoft*, 214 F.3d at 1347.

The "omitted element" test is based on questionable precedents and unclear decisions. Other cases that have been used to support the test do not really go to the question of whether every element of an invention needs to be claimed. For example, Microsoft cited *Gentry Gallery, Inc. v. Berkline Corp.,* 134 F.3d 1473, 45 U.S.P.Q.2d (BNA) 1498 (Fed. Cir. 1998) in order to support their contention that all elements of an invention need to be claimed. *Microsoft,* 214 F.3d at 1347 (Newman, J. concurring.). However, this case merely states the oft-stated proposition that claims that are broader than the application's disclosure will not be allowed. *Id.* And, finally, cases have stated the proposition that there is, at least with respect to combination patents, no "essential" element. *Aro Mfg. Co. v. Convertible Top Replacement Co.*, 365 U.S. 336, 345, 128 U.S.P.Q. (BNA) 354 (1961) ("[T]here is no legally recognizable or protected "essential" element, "gist" or "heart" of the invention in a combination patent.")

In summary, though the validity of the "omitted" or "essential" element test is in doubt, this application does not even fit the test. The application discloses more than enough information to allow one of ordinary skill in the art to practice the invention. The elements which the Examiner says are omitted from the claims are certain of the variable ways to accomplish the defined steps of the invention. Given the language of the MPEP section, and the

cases cited, the present claims should not be rejected based upon omitted essential elements. Applicants believe that this rejection should be reversed.

In the most recent Office Action, the Examiner responds to the Applicants' arguments with regard to "essential elements" by stating that Applicants' argument applies only to 35 USC § 112, first paragraph, while the rejection is based on 35 USC § 112, second paragraph. To the contrary, the quotes from MPEP section, and the argument presented by the Applicants' go to both the first and second paragraph of section 112. Note, for example, the following language quoted from MPEP section 2172.01:

> "In addition, a claim which fails to interrelate essential elements of the invention as defined by applicant(s) in the specification may be rejected under 35 U.S.C. 112, second paragraph , for failure to point out and distinctly claim the invention See *In re Venezia*, 530 F.2d 956, 189 USPQ 149 (CCPA 1976); *In re Collier*, 397 F.2d 1003, 158 USPQ 266 (CCPA 1968)." **(Emphasis added.)**

There can be little doubt that this statement refers to the **second paragraph**, and, like the remainder of the MPEP section, is limited to essential elements as defined by applicants in the specification.

Further, the Examiner argues that :

> The determination of "essential elements" required to be claimed to support the enablement of claims and to adequately describe the metes and bounds of the invention to one of ordinary skill in the art is not a subjective test on the applicant. The standard is what "one of ordinary skill in the art" would have understood to be essential elements.

The Applicants have submitted with this Amendment a declaration from Jerry W. Kuper. Dr. Kuper is a person skilled in the field of lasers and laser systems who has worked in the field of laser design and development for more than 20 years. Moreover, Dr. Kuper has supervised scientists working in the field through this 20 year period, and is thus particularly knowledgable regarding the background and knowledge of persons of ordinary skill in the art to which this invention pertains, as of the effective filing date of this application. In this regard, Dr. Kuper declares:

> E) By ordinary skill, I mean scientists who are capable of understanding lasers and laser systems, and who are capable of designing such systems for specific applications, using known techniques and devices. These are scientists who know the vocabulary related to lasers, and are capable of reading descriptions of known techniques and devices in this field in order to implement known technology.

Moreover, Dr. Kuper has no financial interest in this application...he is an independent expert.

In regard to the "essential elements" rejection, and the Examiner's statement that the standard is "what 'one of ordinary skill in the art' would have understood to be essential elements, Dr. Kuper states:

> K) Persons of ordinary skill in the laser art, as of the effective filing date of this application, would understand the words used in Claims 22-28, 33, 34 and 57-64.
>
> 1) Persons of ordinary skill in the laser art, as of the effective filing date of this application, would have understood the term "CW mode-locked laser pulses", because this term was commonly used and well defined in the art at the time. This term was understood to mean pulses output from a mode-locked laser cavity at each circulation of mode-locked light within the cavity, in the form of a continuous pulse series.
>
> 2) Persons of ordinary skill in the laser art, as of the effective filing date of this application, would have understood not only what "Q-switched mode-locked laser pulses" are, but would have know how to generate such pulses. In fact, as of that date, knowledge of Q-switched mode-locked laser pulses and their generation was common in this field. See, for example, the Hordvik publication which has been cited in this case by the Examiner.
>
> 3) Persons of ordinary skill in the laser art, as of the effective filing date of this application, would understand not only what "suppressing Q-switching" means, but would understand the ways in which such suppression could be accomplished. See, for example, the Hordvik publication which has been cited in this case by the Examiner.
>
> M) From the description provided in the specification of the pending application, persons of ordinary skill in the laser art would be able to design and build a laser system which operates according to the methods defined in Claims 22-28, 33, 34 and 57-64.
>
> N) More specifically, with regard to Claim 22, persons of ordinary skill in the laser art would be able to generate Q-switched mode-locked laser pulses, and would be able to suppress Q switching to generate cw mode-locked pulses.
>
> O) The steps identified on page 2 of the rejection of the application mailed on 6/18/2003 are all well known to someone of skill in the art of lasers, even without the benefit of the specification of this application. Thus, (1)pumping a gain medium within a resonant Fabry-Perot laser cavity; (2) generating Q-switched mode-locked laser pulses using a saturable absorber located within said resonant Fabry-Perot optical cavity; (3) absorbing Q-switched laser pulses by insertion of a Two-Photon Absorber within a resonant Fabry-Perot

optical cavity, and (4) outputting a mode-locked laser pulse from a Fabry-Perot optical cavity were all well known steps as of the effective filing date of this application. However, the generation or evolution of CW mode-locked laser pulses by suppressing Q-switching, to the best of my knowledge, was not known at that time.

In response to the Examiners statement that "it is unclear from the claim language how a cw mode-locked laser pulse is generated with the claimed steps," the Applicants respond that the specification provides a clear description of how cw mode-locked laser pulses are generated using this invention. Claims are not required to provide every detail for implementing an invention, but only the necessary elements of the inventive process, because the steps cited by the Examiner are well known variants to those skilled in the art. To require the Applicants to limit their claims to a particular selection of alternative incidental steps would deny them of the breadth of protection which the law requires. The Examiner's latest office action replies to this argument by stating that:

> "This argument is not persuasive because it is not clear from the claims what the Applicant is claiming. The characteristics of a CW laser and a pulse laser are different. Someone of ordinary skill in the art recognizes a CW laser as generating a sinusoidal type pattern of laser energy continuously; conversely, a pulse laser is characterized as having an output that has a definite beginning and end. The Applicant claims "CW mode-locked laser pulses" without the necessary method steps within the claims to establish a CW mode-locked laser pulses.
>
> "In response to applicant's arguments, the recitation of 'generating CW mode-locked laser pulses' has not been given patentable weight because the recitation occurs in the preamble. A preamble is generally not accorded any patentable weight where it merely recites the purpose of a process or the intended use of a structure, and where the body of the claim does not depend on the preamble for completeness but, instead, the process steps or structural limitations are able to stand alone. See *in re Hirao*, 535 F.2d 67, 190 USPQ 15 (CCPA 1976) and *Kropa v. Robie*, 187 F. 2d 150, 152, 88 USPQ478, 481 (CCPA 1951). Furthermore, Claims 22-28 and 33-34 do not recite adequate steps and inter-step relationships to support a method of generating CW mode-locked laser pulses; therefore, the preamble has not been given any patentable weight."

Applicants refer the Examiner to the following paragraphs K and S from the declaration of Dr. Kuper:

> K) Persons of ordinary skill in the laser art, as of the effective filing date of this application, would understand the words used in Claims 22-28, 33, 34 and 57-64.
>
> 1) Persons of ordinary skill in the laser art, as of the effective filing date of this application, would have understood the term "CW mode-locked laser pulses",

because this term was commonly used and well defined in the art at the time. This term was understood to mean pulses output from a mode-locked laser cavity at each circulation of mode-locked light within the cavity, in the form of a continuous pulse series.

.....

S) The following statement at page 6 of the rejection of the application mailed on 6/18/2003 is incorrect in the context of this application: "The characteristics of a CW laser and a pulse laser are different. Someone of ordinary skill in the art recognizes a CW laser as generating a sinusoidal type pattern of laser energy continuously; conversely, a pulse laser is characterized as having an output that has a definite beginning and end". In fact, mode-locked lasers produce pulse outputs and were commonly operated in a CW mode as of the effective filing date of this application. Such lasers, as stated above, produce an output pulse at each circulation of mode-locked light within the cavity, thus forming a continuous pulse series.

From these paragraphs of Dr. Kuper's declaration, it is clear that the Examiner has a misconception of the phrase "CW mode-locked laser pulses" which, by his own admission, has led to his refusal to give patentable weight to the preamble of claims. Applicants request that the rejection under 35 USC § 112, paragraph 2 be withdrawn, particularly in view of the evidence presented herewith in the form of Dr. Kuper's declaration.

Finally, as to the objection to Claim 34, the ending word "and" was removed in the amendment filed April 4, 2003.

35 U.S.C. 102 REJECTION

The examiner rejected claims 22-28, 33 and 34 as anticipated by Wayne. The Examiner states that Wayne discloses a method of generating laser pulses comprising generating Q-switched mode-locked laser pulses (col. 4, line 66- col. 5, line 27; abstract) and suppressing q-switching (col. 6, lines 28-50; abstract). The Examiner also states that the method disclosed by Wayne is a "method of generating laser pulses in a continuous wave mode-locked fashion (abstract). The Examiner states, however, that this limitation is not given patentable weight because the body of the claim does not support a cw mode-locked laser pulse, i.e., there is not a claimed step to manipulate any structural feature of the invention to generate a cw mode-locked laser pulse.

As to the final point raised by the Examiner, the applicant previously added new claims in this application which add to the steps of the claims (as opposed to the preamble alone) the

generation of cw mode-locked laser pulses. Thus, this element of the rejection should not apply to these new claims.

As to the anticipation rejection itself, by its own terms, the Wayne reference teaches a Q-switched laser which is cavity dumped, not a cw mode-locked laser. Nowhere does Wayne teach or suggest a cw mode-locked laser. The only mention of CW is in the abstract, where Wayne describes the basic type of laser used as his starting point. He then immediately states what he does with this laser...he converts polarization states to Q-switch the laser, then terminates the voltage near the maximum Q-switch buildup to convert the polarization to cavity dump an output pulse. Simply stated, this is not a cw mode-locked laser, and it does not produce cw mode-locked laser pulses. Moreover, the Wayne patent never states that it produces cw mode-locked laser pulses. Nor does the Wayne patent teach the suppression of Q-switching to produce cw mode-locked pulses. Rather, Wayne teaches cavity dumping at the peak of the intracavity Q-switch buildup (col. 6, ln. 41-43) to dump the cavity to provide an optical pulse. This is the antithesis of cw mode-locking. Applicants request that this rejection be withdrawn.

Again, reference to the statements in Dr. Kuper's declaration are helpful, since they provide further evidence to bolster the argument above:

> L) Notwithstanding the fact that "CW mode-locked laser pulses" were well understood at the effective filing date of this application, and that Q-switching and its suppression were also well known in this field as of the effective filing date of this application, I am not aware of any knowledge in this field, as of that effective date, that CW mode-locked laser pulses could be evolved or generated from the suppression of Q-switching.
>
> P) Wayne et al. (US 4176327) does not disclose the generation of CW mode-locked laser pulses. Rather, by its own terms, the Wayne laser is cavity dumped. A cavity dumped laser was well known as of the effective filing date of this application as a laser in which the energy within the cavity is allowed to build up until a switched phenomenon dumps the energy to the cavity output. This is not a CW mode-locked laser, and does not produce CW mode-locked pulses. The mention of CW in the Wayne abstract describes only the basic type of laser used as his starting point, which Wayne converts to a Q-switched laser for his experiment.
>
> Q) While the Wayne patent states in his Claim 1 that his laser energizes "the gain medium to obtain a population inversion therein capable of providing continuous wave radiation oscillating with the laser", Wayne does not produce a CW output, as stated above. Rather, Wayne cavity dumps the laser to concentrate as much power as possible in a single pulse. This is, effectively, the opposite of CW mode-locked laser pulses.

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Applicants request a reconsideration of the anticipation rejection in view of the fact, as evidence by the Kuper declaration, that Wayne does not anticipate these claims.

35 U.S.C. 103 REJECTION

The examiner rejected Claim 25 as obvious over Wayne in view of Hordvik. As stated above, Wayne does not meet the essential limitations of the parent claim as suggested by the Examiner. Hordvik does not correct this fundamental void in the cited art. Rather, Hordvick teaches only a Q-switched laser with stretched pulses, not a laser in which cw mode-locked energy is generated from Q-switched mode-locked pulses. The most that Hordvick could add to Wayne's disclosure is the stretching of pulses, not the generation of cw mode-locked pulses. Applicants request that this rejection be withdrawn. This fact is confirmed by Dr. Kuper in his declaration:

> R) The Hordvik article, identified above, only teaches a Q-switched laser with stretched pulses, not a CW mode-locked laser.

Applicants continue to believe that the rejections in the case should be withdrawn, particularly in view of the additional evidence now presented in the form of the declaration of Dr. Kuper.

Please charge any additional fees, including any fees for additional extension of time, or credit overpayment to Deposit Account No. 11-1410.

Respectfully submitted,

KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: 8/15/03

By: _____

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PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant	:	Min Jiang et al.
Appl. No.	:	09/738,372
Filed	:	December 15, 2000
For	:	RESONANT FABRY-PEROT SEMICONDUCTOR SATURABLE ABSORBERS AND TWO PHOTON ABSORPTION POWER LIMITERS
Examiner	:	Jeffrey N. Zahn

Group Art Unit 2828

I hereby certify that this correspondence and all marked attachments are being deposited with the United States Postal Service as first-class mail in an envelope addressed to: United States Patent and Trademark Office, P.O. Box 1450, Alexandria VA 22313, on

August 13, 2003
(Date)

James B. Bear, Reg. No. 42,501

DECLARATION UNDER 37 C.F.R. §1.132

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

I, Jerry W. Kuper, under penalty of perjury, hereby declare:

MY BACKGROUND

A) Exhibit A to this declaration is a copy of my resume. The statements in this resume are true, and accurately describe my work experience, my education, my skills and training, and the papers and publications which I have authored or co-authored.

B) Based on my experience and background, I believe that I am skilled in the field of lasers and laser systems. Moreover, as shown in my resume, I have worked in the field of laser design an development for more than 20 years.

C) During my work in the laser field, I have supervised scientists working in this field. My supervisory activities have continued throughout the past 20 years, but have grown as my experience has increased.

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D) Thus, since the late 1980's, a substantial part of my employment duties have involved the supervision, as a team leader or program manager, of persons of ordinary skill in the laser field. Through this experience, I have grown to understand the background and knowledge of persons of ordinary skill in the laser field, as well as the terminology they use and are familiar with. More specifically, I understand the background and knowledge of persons of ordinary skill in the art to which this invention pertains as of the effective filing date of the application, namely September 8, 1998.

E) By ordinary skill, I mean scientists who are capable of understanding lasers and laser systems, and who are capable of designing such systems for specific applications, using known techniques and devices. These are scientists who know the vocabulary related to lasers, and are capable of reading descriptions of known techniques and devices in this field in order to implement known technology.

MY INDEPENDENCE

F) I was engaged as an expert to explain the level of ordinary skill in the art as it applies to the patent application listed in the heading of this declaration.

G) I am not employed by the inventors named in this application, nor the assignee thereof, Imra America.

H) I have no financial interest in this application, or in the outcome of its examination.

I) While I have not prepared the exact words of this declaration (as they were prepared in consultation with
the attorney for the assignee), I have reviewed the declaration, and it is an accurate reflection of my beliefs.

WHAT I HAVE REVIEWED

J) In preparing this declaration I have reviewed the following documents:

1) The specification and pending claims of the patent application.
2) The rejection of the application mailed on 6/18/2003
3) The Wayne et al. patent (US 4176327).
4) The Hordvik article (Pulse stretching utilizing two-photon-induced light absorption, IEEE Journal of Quantum Electronics, April 1970).

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MY CONCLUSIONS

K) Persons of ordinary skill in the laser art, as of the effective filing date of this application, would understand the words used in Claims 22-28, 33, 34 and 57-64.

1) Persons of ordinary skill in the laser art, as of the effective filing date of this application, would have understood the term "CW mode-locked laser pulses", because this term was commonly used and well defined in the art at the time. This term was understood to mean pulses output from a mode-locked laser cavity at each circulation of mode-locked light within the cavity, in the form of a continuous pulse series.

2) Persons of ordinary skill in the laser art, as of the effective filing date of this application, would have understood not only what "Q-switched mode-locked laser pulses" are, but would have know how to generate such pulses. In fact, as of that date, knowledge of Q-switched mode-locked laser pulses and their generation was common in this field. See, for example, the Hordvik publication which has been cited in this case by the Examiner.

3) Persons of ordinary skill in the laser art, as of the effective filing date of this application, would understand not only what "suppressing Q-switching" means, but would understand the ways in which such suppression could be accomplished. See, for example, the Hordvik publication which has been cited in this case by the Examiner.

L) Notwithstanding the fact that "CW mode-locked laser pulses" were well understood at the effective filing date of this application, and that Q-switching and its suppression were also well known in this field as of the effective filing date of this application, I am not aware of any knowledge in this field, as of that effective date, that CW mode-locked laser pulses could be evolved or generated from the suppression of Q-switching.

M) From the description provided in the specification of the pending application, persons of ordinary skill in the laser art would be able to design and build a laser system which operates according to the methods defined in Claims 22-28, 33, 34 and 57-64.

N) More specifically, with regard to Claim 22, persons of ordinary skill in the laser art would be able to generate Q-switched mode-locked laser pulses, and would be able to suppress Q switching to generate cw mode-locked pulses.

O) The steps identified on page 2 of the rejection of the application mailed on 6/18/2003 are all well known to someone f skill in the art of lasers, even without the benefit of the

specification of this application. Thus, (pumping a gain medium within a resonant Fabry-Perot laser cavity; (2) generating Q-switched mode-locked laser pulses using a saturable absorber located within said resonant Fabry-Perot optical cavity; (3) absorbing Q-switched laser pulses by insertion of a Two-Photon Absorber within a resonant Fabry-Perot optical cavity, and (4) outputting a mode-locked laser pulse from a Fabry-Perot optical cavity were all well known steps as of the effective filing date of this application. However, the generation or evolution of CW mode-locked laser pulses by suppressing Q-switching, to the best of my knowledge, was not known at that time.

P) Wayne et al. (US 4176327) does not disclose the generation of CW mode-locked laser pulses. Rather, by its own terms, the Wayne laser is cavity dumped. A cavity dumped laser was well known as of the effective filing date of this application as a laser in which the energy within the cavity is allowed to build up until a switched phenomenon dumps the energy to the cavity output. This is not a CW mode-locked laser, and does not produce CW mode-locked pulses. The mention of CW in the Wayne abstract describes only the basic type of laser used as his starting point, which Wayne converts to a Q-switched laser for his experiment.

Q) While the Wayne patent states in his Claim 1 that his laser energizes "the gain medium to obtain a population inversion therein capable of providing continuous wave radiation oscillating with the laser", Wayne does not produce a CW output, as stated above. Rather, Wayne cavity dumps the laser to concentrate as much power as possible in a single pulse. This is, effectively, the opposite of CW mode-locked laser pulses.

R) The Hordvik article, identified above, only teaches a Q-switched laser with stretched pulses, not a CW mode-locked laser.

S) The following statement at page 6 of the rejection of the application mailed on 6/18/2003 is incorrect in the context of this application: "The characteristics of a CW laser and a pulse laser are different. Someone of ordinary skill in the art recognizes a CW laser as generating a sinusoidal type pattern of laser energy continuously; conversely, a pulse laser is characterized as having an output that has a definite beginning and end". In fact, mode-locked lasers produce pulse outputs and were commonly operated in a CW mode as of the effective

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filing date of this application. Such lasers, as stated above, produce an output pulse at each circulation of mode-locked light within the cavity, thus forming a continuous pulse series.

Respectfully submitted,

Dated: August 14, 2003

By: _____
Jenny W. Kuner

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EXHIBIT A

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585-218-0744 Home

BACKGROUND SUMMARY

Extensive experience in optical system design relating to solid-state lasers, flat panel displays, and optical imaging systems. Managed programs that produced prototype systems for government, commercial and internal customer applications with budgets over $900K. An innovative results-orientated scientist with hands on laboratory skills and a bias for action.

WORK EXPERIENCE

EXFO Burleigh Products Group 1/2001-Present

Project Leader

Lead a team of software, mechanical, and electrical engineers in the development of a semi-automated workstation for the alignment of telecommunication optical components. Responsibilities include the workstation's optical imaging system, alignment process development, performance verification for manufacturing and outside customers.

Lead a team of software, mechanical, and electrical engineers in the development of a telecom passive component analyzer based upon a Fourier transform interferometer.

Laser Energetics, Inc. Mercerville, NJ 8/1998-1/2001

Director of Solid-State Laser Systems

Developed solid-state laser systems for marking and micro machining applications. Designed high pulse repetition rate deep ultraviolet laser systems for commercial applications.

AlliedSignal, Inc. Morristown, NJ 1984-7/1998

Principal Scientist, 1989-1998.

Developed high brightness, dimmable backlight for an avionic active matrix liquid crystal displays.

Co-developed a viewing screen for an avionic active matrix liquid crystal display using a solid-state ultraviolet proximity photolithography system.

Co-developed a flat panel display technical performance database and analyzed the suitability of the various technologies for incorporation into avionic and ruggedized displays.

Diagnosed problems associated with an online laser displacement measurement system used to determine the thickness of copper laminated boards. Designed offline noncontact optical inspection system to measure the in plane interlayer movement of a multilayer laminate board. Cost of poor quality estimated at $250K.

Member of a remediation team, which analyzed various alternatives for insitu diagnosis of an automotive brake system component. The potential company liability avoided was greater than $20 million dollars.

JERRY KUPER **WORK EXPERIENCE**

Co-developed optical inspection equipment to measure product quality from high volume lithography and injection molding manufacturing lines. High-resolution imaging and photometric measurement systems were used for both offline and online noncontact inspection under class 1000 clean room conditions.

Program manager for commercial laser development: produced two new prototype laser systems, which were displayed at the CLEO 1993, exhibit, May 1993. Direct supervision of mechanical, electrical and optical designs personnel. Assisted in the market advertisement of laser products.

Program manager for a SEMATECH funded project on the development of an alternative solid-state DUV laser system for photolithography. System spectral parameters exceeded state of the art excimer lithography system performance.

Program manager for a prototype laser lithotripter system for Storz Medical AG, Kreuzlingen, Switzerland. This prototype was successfully tested in a clinical trial conducted at Mansura University Medical Center, Cairo, Egypt, August 1992.

Senior Research Physicist, 1987- 1988.
Developed prototype laser systems for various external customer applications: Medical laser systems for angioplasty and lithotripsy; IR and UV laser systems for active illumination using a gated, intensified Gen III CID camera;
Co-developer of a high power blue laser system for US Navy Communication System.

Research Physicist, 1984 - 1987.
Developed high performance Q-switched alexandrite laser systems.

TRW, Inc., Applied Technology Division, Redondo Beach, CA **1982-1984**

Member of Technical Staff
Conducted experiments on chemical kinetics on the reaction of singlet oxygen with pentavalent phosphorous compounds and made a presentation of the results to the Air Force.
Conducted experiments on wavefront distortion correction using Stimulated Brillioun Scattering for high power laser systems.
Developed slab and active mirror lasers system components.

EDUCATION

PhD., Chemical Physics: University of Rochester, Rochester, NY, 1983. Thesis topic: Fluorescence Studies of Methyl Salicylate in a Supersonic Molecular Beam.

M.S., Physical Chemistry: University of Rochester, Rochester, NY, 1978.

B.A., with Honors in Chemistry: Williams College, Williamstown, MA, 1976.

COMPUTER SKILLS
Microsoft Office 2000, Microsoft Project, *LightTools* CAD experience, knowledge of FORTRAN.

TRAINING

Program management and Leadership training, 1996.
Total Quality Leadership training, 1992. TQS training 1995

JERRY W. KUPER

PAPERS AND PUBLICATIONS

J.D. Luff, D.K. Mansfield, S.H. Zaidi, H. Aschoff, J.W. Kuper, and R.B. Miles, "Development of a Tunable Megahertz Pulse-Burst Alexandrite Laser System," Proceedings of the 34th AIAA Plasmadynamics and Lasers Conference, June 2003.

J.Kuper, Y. Fisher, and F. Duver, "Precision Optical Component Alignment," Proceeding of the Optoelectronic Microsystems International Conference 2003.

W. Gomall and J. Kuper, "A Single-Robot Technique For Pigtailing Fiber Arrays To Planar Lightwave Circuits," Proceedings of the Optoelectronic Microsystems International Conference 2002.

R. Battis, J. Kuper, C. Anderson, and A. Beger, "Alexandrite lasers make their mark in industrial applications," Laser Focus World, May, 2000. Pp. 257-262.

J. Kuper, T. Chin, and P. Papanestor, 'High Average Power, Narrowband 248 nm Alexandrite Laser System,' SPIE Proceedings 2115, pp. 88-93.

J. Kuper, T. Chin, P. Papanestor, and J. Krasinski, 'High Average Power Blue Alexandrite Laser System,' OSA Proceedings on Advanced Solid-State Lasers, Vol.13, pp. 14-16.

J. Kuper, 'Frequency Doubled Alexandrite UV Laser Systems for Medical Research,' Pulsed Lasers in Angioplasty International Workshop, Tuebingen, Germany, May 1990.

J. Kuper, T. Chin, and H. Aschoff, 'Extended Tuning Range of Alexandrite at Elevated Temperatures,' OSA Proceedings on Advanced Solid-State Lasers 1990, pp. 56-58.

W. Rapoport, J. Kuper, J. Krasinski, and T. Chin, 'High Brightness Alexandrite Laser,' OSA Proceedings on Advanced Solid-State Lasers 1990, pp. 170-173.

R. Boyd, J. Kuper, and D. Harter, 'Lamp Pump Chamber Optimization: Modeling and Experimental Verification of Absorption in Biaxial, Trichroic Media,' OSA Proceedings on Tunable Solid-State Lasers, Vol. 5, pp. 385-392.

R. Sam, K. Leslie, J. Goodwin, R. Page, J. Kuper, and T. Chin, 'Real Time TV Holography Using an Alexandrite Laser,' Proceedings of the 33rd Annual International Technical Symposium on Optical and Optoelectronic Applied Science and Engineering.

B. Steiger and J. Kuper, 'A Q-switched Alexandrite Laser for Laser Induced Shock Wave Lithotripsy (LISL)- Basic and In Vitro Studies,' European Journal for Lasers in Medicine and Surgery, Vol. 2, pp 43-47.

J. Kuper, W. Langert, M. Baker, J. Barrett, L. Deckelbaum, M. Stetz, F. Cutruzzola, B. Steiger, 'Medical Applications of Alexandrite Laser Systems,' OSA Proceedings on Tunable Solid-State Lasers 1987.

L. Deckelbaum, M. Stetz, F. Cutruzzola, J. Kuper, M. Baker, and J. Barrett. 'A Pulsed Ultraviolet Alexandrite Laser for Angioplasty: Evaluation of Tissue Ablation and Fiber Optic Conduction,' Annual Meeting of the American College of Cardiology, New Orleans, 1987.

J. Kuper, W. Langert, J. Barrett and R. Morris, 'Compact Integrated, High Efficiency Alexandrite Lasers, Proceedings of the International Conference on LASERS 1986.

JERRY KUPER **PAPERS AND PUBLICATIONS**

M. Valley, S. Pfeifer, D. Brown, J. Kuper, D. Bullock, M. Lainhart, and R. Wagner, 'Wave Optics Modeling of Stimulated Brillouin Scattering,' Proceedings of the 1986 SPIE Conference, Orlando, FL.

J. Kuper, R. Boyd, J. Barrett, and R. Morris, 'Conductively Cooled Alexandrite Laser System,' CLEO 1986, TuK 28.

D. Brown, R. Bowman, J. Kuper, K. Lee, and J. Menders, 'High Average Power Active-Mirror Amplifier,' Applied Optics, 25, 612 (1986).

W. Gates, R. Sam, A. Stephenson, J. Barrett, J. Kuper, M. Baker, A. Bisio, R. Barber, V. Ayre, and R. Milton, 'Field Test of Alexandrite Lasers,' 24th IRIS Symposium on Infrared Countermeasures, John Hopkins University, April, 1986.

J. Barrett, T. Chin, D. Harter, J. Krasinski, J. Kuper, J. Pete, D. Seibert, H. Samelson, and J. Walling, 'Advances in Alexandrite Laser Technology,' 2nd Annual Conference on Tunable Solid-State Lasers, Arlington, VA, 1985.

D. Brown, J. Kuper, and K. Lee, 'Face-Pumped Slab Dye Laser,' 1984 OSA Annual Meeting, San Diego.

M. Valley, S. Pfeifer, and J. Kuper, 'Correction of Medium and Component Aberrations in Laser Amplifiers by Phase Conjugation,' 1984 OSA Annual Meeting, San Diego.

D. Brown, R. Bowman, J. Kuper, K. Lee, and J. Menders, 'Active-Mirror Amplifier for High Average Power Nd:Glass Laser Systems,' CLEO 1984, Anaheim.

D. Brown and J. Kuper, 'Tunable Slab Geometry Solid-State Lasers,' 1st Annual Conference on Tunable Solid State Lasers, LaJolla, CA, 1984.

J. Kuper and L. Marabella, 'Singlet Oxygen-Pentavalent Phosphorus Reactions,' 1983 AFOSR Molecular Dynamics and Surface Chemistry Contractors Conference, Hanscom AFB, MA, 1983.

J. Kuper and D. Perry, 'Spectroscopy and Intramolecular Relaxation of Methyl Salicylate in its First Excited Singlet State,' J. Chem. Phys., 80, 4640 (1984).

HONORS AND SOCIETIES

Member Optical Society of America 1976 - present.
Member Society for Information Display 1994 - 2001.
1993 Special Recognition for Market Study of New MicroOptical Technology.
1992 Research Director's Award for Outstanding Achievement.
1990 Allied-Signal Technical Achievement Award
1990 Allied-Signal Team Recognition Award.
1986 Allied-Signal Technical Achievement Award.
Sherman Clarke Fellowship, University of Rochester
Undergraduate Analytical Chemistry Award ACS, Williams College.
State of Connecticut Scholar, 1972-76.

JERRY KUPER **PATENTS**

Coinventor on fourteen U.S. patents on lasers, fiberoptics and illumination systems: 4,734,913; 4,835,786; 4,858,242; 4,933,946; 4,944,567; 4,949346; 5,009,658; 5,257,274; 5,555,329; 5,761,355; 5,839,823; 6,164,789; 6,186,649; 6,550,942;

Two U.S. Provisional patents: "System and Method for Aligning an Input Fiber with and Input Port of a Waveguide Device." "A Single-Robot Method and Apparatus for Assembling Fiber Arrays to an Optical Device."